



NOAA

April 26, 2017

Unified Modeling Task Force (UMTF)

Webinar

UMTF Co-Chairs: Jason Link and Hendrik Tolman

UMTF Members: Eric Bayler (NESDIS), Chris Brown (NESDIS), Pat Burke (NOS), Jessie Carman (OAR), Scott Cross (NESDIS), John Dunne (OAR), Doug Lipton (NMFS), Annarita Mariotti (OAR), Rick Methot (NMFS), Ed Myers (NOS), Tim Schneider (NWS), Monica Grasso (PRSS), and Katie Robinson (OAR)

[doi:10.7289/V5GB2248](https://doi.org/10.7289/V5GB2248)

What is Unified Modeling?

Unified modeling uses the most effective (i.e. typically smallest) number of actual models for a set of similar tasks.



It ***does not*** imply unitary modeling where only a single model, even if for each application type, is allowed.



Why does NOAA need a unified modeling approach?



Why does NOAA need a unified modeling approach?





- Provides a business model where modeling costs are minimized
- Facilitates critical mass for model development
- Leverages modeling community efforts effectively and with reduced operational and maintenance (O&M) costs for NOAA and its customers.

Vision




- **Effective modeling in support of NOAA's Mission –**
NOAA models are interoperable and accessible, optimally interface with observations, and are efficiently integrated into a prudent set of scalable systems that cross disciplinary boundaries and serve the full suite of mission-driven applications.

Timeline




May 2016

- The Research Council stood up the UMTF




June 2016

- UMTF begins scoping for a NOAA unified modeling strategy



August 2016

- UMTF identifies unified modeling themes and recommended actions



October 2016

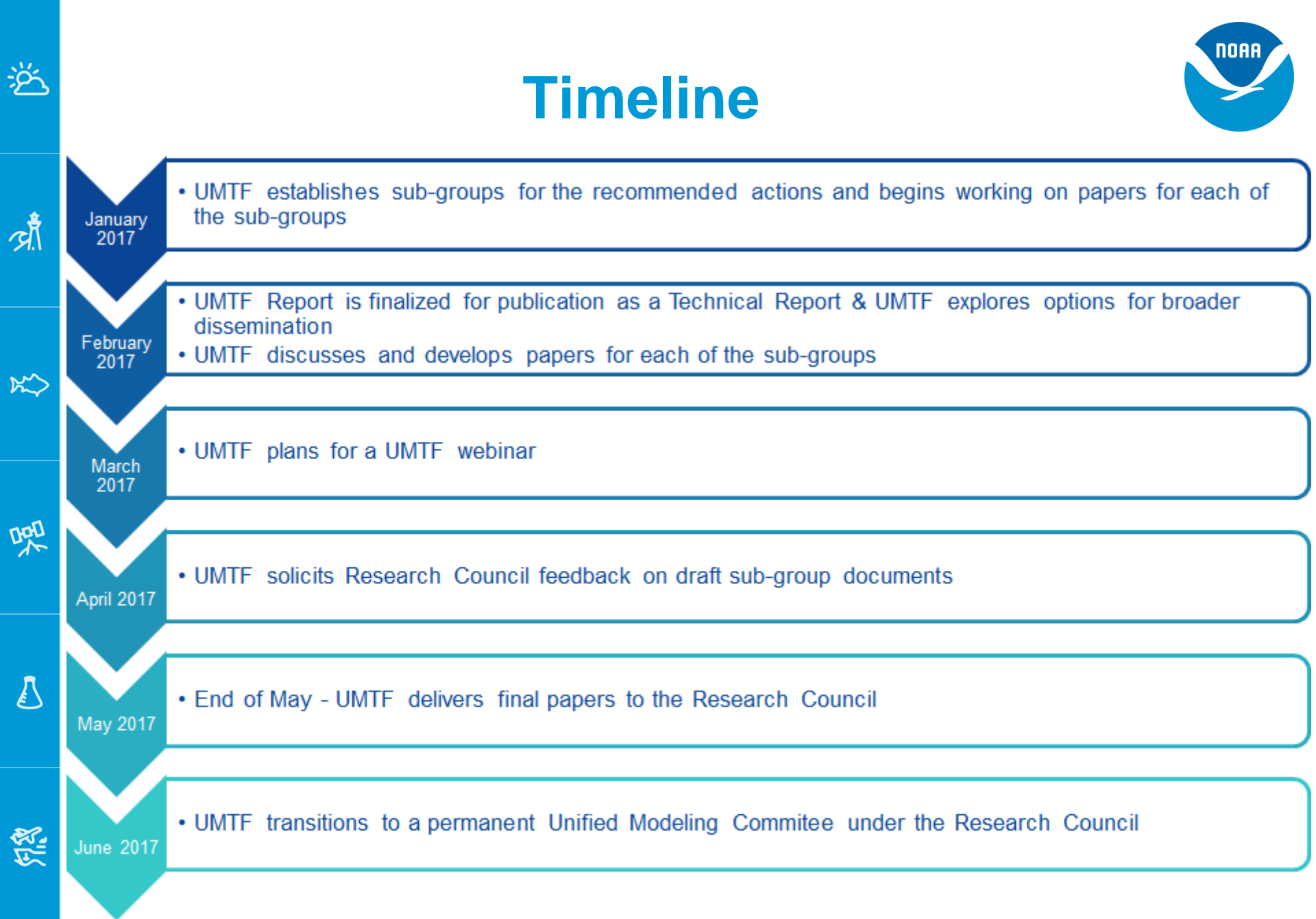
- UMTF submits its first deliverable, a white paper outlining a unified modeling strategy, to the Research Council



November 2016

- Research Council approves the white paper and recommended actions

Timeline





RC Tasks to the Task Force

- Develop a unified modeling approach for the agency ✓
- Within six months, produce a strategy to guide NOAA towards a unified modeling approach including recommendations for short-term actions as well as longer term needs ✓
- Identify potential topics for further exploration
- Facilitate Cross-Line Office transdisciplinary collaboration among NOAA modelers





Overview of the White Paper



- 1.What does Unified Modeling mean
- 2.What is in it for NOAA
- 3.Elements of Unified Modeling
- 4.Themes for Unified Modeling and Data Assimilation
- 5.Recommended Actions

Table of Contents

Vision Statement.....	2
1. What does Unified Modeling mean.....	2
2. What is in it for NOAA.....	2
3. Elements of Unified Modeling	3
3.1 Types of Unified Modeling.....	3
3.2 Partnerships.....	4
3.3 Community Modeling	5
3.4 Multi Model Ensembles (MMEs)	5
3.5 Computing Resources	6
3.6 Data Assimilation	7
3.7 Common Modeling Frameworks, Architectures, and Platforms	7
3.8 Venues and Mechanisms for Exchanging Best Modeling Practices	8
3.9 Model Review Protocols	8
3.10 Data Management in Support of Unified Modeling	9
4. Themes for Unified Modeling and Data Assimilation.....	10
4.1 Software, HPC, and Data Management Infrastructure.....	10
4.2 Modeling and Numerical Approaches	10
4.3 The Business Model for Effective R2X and X2R	11
4.4 Communication and Community Engagement.....	12
4.5 Cross-Disciplinary Coupling.....	12
4.6 Integration of Socio-Economics.....	12
4.7 Governance and Best Practices for NOAA	12
5. Recommended Actions.....	13
5.1 Establish a Formal Body to Coordinate Modeling	13
5.2 Establish a NOAA-Wide process for Information Exchange.....	13
5.3 Ensure Adequate Resources to Execute NOAA-Wide Modeling.....	13
5.4 Define Best Practices in NOAA Modeling.....	13
5.5 Establish Regular Review for Model Redundancy and Retention.....	14
5.6 Make HPC More Accessible to all of NOAA	14
Table 1: Recommended Actions vs. Theme.....	15
Appendix A: Relevant documentation	16
Appendix B: Glossary	17



Themes for Unified Modeling and Data Assimilation



- **4.1:** Software, HPC, and Data Management Infrastructure



- **4.2:** Process Modeling and Numerical Approaches

- **4.3:** The Business Model for Effective R2X and X2R



- **4.4:** Communication and Community Engagement

- **4.5:** Cross-Disciplinary Coupling



- **4.6:** Integration of Socio-Economics

- **4.7:** Governance and Best Practices for NOAA



Working Groups from Recommendations



- **5.1:** Establish a Formal Body to Coordinate Modeling
- **5.2:** Establish a NOAA-Wide Process for Information Exchange
- **5.3:** Ensure Adequate Resources to Execute NOAA-Wide Modeling
- **5.4:** Define Best Practices in NOAA Modeling
- **5.5:** Establish Regular Review of Model Redundancy and Retention
- **5.6:** Make HPC More Accessible to all of NOAA

5.1: Establish a Formal Body to Coordinate Modeling



The Research Council agreed to stand-up a formal unified modeling body as a Research Council subcommittee

The Task Force will transition to the permanent group in June



Value

- Provides corporate coordination of modeling activities and accountability for achieving integrated agency objectives.

5.2: Establish a NOAA-Wide Process for Information Exchange



Establish an approach for exchanging information across NOAA and with the broader modeling community. Potential fora include meetings, webinars, training, workshops, etc.



Value

- Enhances collaboration and improves communication.

5.3: Ensure Adequate Resources to Execute NOAA-Wide Modeling



Develop a budget initiative to better resource modeling needs.



Value

- Addresses resource needs (such as FTEs, HPC capacity, and corporate infrastructure) necessary to support a unified modeling approach for NOAA.

5.4: Define Best Practices in NOAA Modeling



Define best practices such as establishing baseline requirements, developing a lightweight procedure for when to use a unified modeling approach, and establishing a vetting process for preferred models/modeling approaches.



Value:

- Establishes a standard way of doing things.

5.5: Establish Regular Review of Model Redundancy and Retention



Develops a process for model validation addressing concerns related to reducing model redundancy and/or outdated models and products.



Value

- Identifies which aspects of old models and associated products are valuable allowing for informed decisions regarding continuity and substitution.

5.6: Make HPC More Accessible to all of NOAA

Facilitate widespread use of HPC and align HPC resources with NOAA priorities.



Value

- Fosters collaborative, integrative modeling

Next Steps

- Finalizing recommendations from the 5 Working Groups
- The Task Force transitions to the permanent group in June
- Need your help in implementing relevant facets of Unified Modeling



Questions

